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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/776,672	02/11/2004	Elizabeth G. Pavel	7608	3482

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EXAMINER

TRAN, BINH X

ART UNIT	PAPER NUMBER
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1765

DATE MAILED: 09/29/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/776,672

Applicant(s)

PAVEL ET AL.

Examiner

Binh X. Tran

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 11 February 2004.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-26 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-26 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 6/7/04; 8/30/04.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 112***

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claim 25 is rejected under 35 U.S.C. 112, first paragraph, as based on a disclosure which is not enabling. The signal has a first level, second level, 3<sup>rd</sup> level, 4<sup>th</sup> level are critical or essential to the practice of the invention, but not included in the claim(s) is not enabled by the disclosure. See *In re Mayhew*, 527 F.2d 1229, 188 USPQ 356 (CCPA 1976). In claim 25 the applicants disclose "the oxygen optical emission signal has a fifth level after the photoresist is remove" (emphasis added). However, applicants fails to discloses the optical emission has the first, second, third and fourth level in the independent claim 16. It is impossible to detect the "fifth level" without knowing the first, second, third and fourth level.

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claim 24 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 24 recites the limitation "the crust" in claim 16. There is insufficient antecedent basis for this limitation in the claim.

***Claim Rejections - 35 USC § 102***

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1, 3-5, 7-11, 15-16, 18-23, 26 are rejected under 35 U.S.C. 102(b) as being anticipated by Ishihara (US 2001/0027023).

Respect to claims 1, Ishihara discloses a method for removing/etching photoresist layer (organic layer, paragraph 0116) comprising the step of:

position the substrate comprising a photoresist layer into a processing chamber  
(See Fig 1);

removing the photoresist layer using a plasma (paragraph 0119-0135);  
monitoring the plasma for hydrogen optical emission during the process  
(paragraph 0136).

Respect to claim 8 and 16, Ishihara discloses monitoring the plasma for both a hydrogen optical emission and an oxygen optical emission (paragraph 0136).

Respect to claims 3 and 18-19, Ishihara teaches the photoresist layer is implanted with arsenic (As), phosphorous (P), or boron (B) (paragraph 0016). Respect to claims 4 and 20, Ishihara teaches the photoresist has been exposed to ions or ion beam (paragraph 0116).

Respect to claims 5, Ishihara does not explicitly disclose the photoresist has been exposed to an electron beam. However, Ishihara clearly teach to expose the

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photoresist layer to the plasma. The online dictionary defines plasma as "*An electrically neutral, highly ionized gas composed of ions, electrons, and neutral particles. It is a phase of matter distinct from solids, liquids, and normal gases*" (See prior art of record). Therefore, the examiner interprets Ishihara inherently teaches to expose photoresist layer to electron beam.

Respect to claims 7 and 21, Ishihara teaches the hydrogen optical emission occurs at a wavelength of about 656 nm (paragraph 0136). Respect to claims 9 and 22, Ishihara discloses the oxygen optical emission occurs at a wavelength of about 777 nm (paragraph 0136). Respect to claims 10-11 and 23, Ishihara teaches to terminate the removing process according to the intensity result of emission peak wavelength of oxygen and hydrogen (paragraph 0136, read on "stopping the etching upon either the hydrogen optical emission obtaining a first level or the oxygen optical emission obtaining a second level, or both").

Respect to claims 15 and 26, Ishihara discloses the emission peak of hydrogen and emission peak of oxygen depend on hydrogen atoms and oxygen atoms. The concentration of hydrogen and oxygen atoms is depended on the input flow rate for each individual gas with respect to each other. Since the flow rate of hydrogen can be correlated with the flow rate of oxygen. Therefore, the hydrogen optical emission is inherently correlated with the oxygen optical emission.

### ***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g). prior art under 35 U.S.C. 103(a).

9. Claims 2, 6, 12-14, 17, 24-25 rejected under 35 U.S.C. 103(a) as being unpatentable over Ishihara in view of Hallock et al. (US 2002/0151156).

Respect to claims 2 and 17, Ishihara fails to disclose the photoresist layer comprises a harden crust layer. However, Ishihara clearly teaches to implant ion such as boron, phosphorous, arsenic into the photoresist layer. Hallock teaches implant boron, phosphorous or arsenic ion to form a harden crust layer (paragraph 0018). It would have been obvious to one having ordinary skill in the art, at the time of invention, to modify Ishihara in view of Hallock by having a harden crust layer because it will prevent ion from penetrating into the surface of the substrate.

Respect to claim 12, Ishihara teaches to monitoring the plasma of oxygen optical emission (paragraph 0136). Respect to claims 6, 13-14, Hallock discloses the optical emission having first level during etching and second level after the crust is removed

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and third after the photoresist is removed (Fig 2-3). Respect to claims 24-25, Hallock discloses that a single optical emission signal having at least three of level (first, second and third). Ishihara teaches to monitor two different optical emission signals. Two optical emission signals should have at least 6 different levels.

### ***Conclusion***

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Dictionary.com defines plasma as "*An electrically neutral, highly ionized gas composed of ions, electrons, and neutral particles. It is a phase of matter distinct from solids, liquids, and normal gases*".

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Binh X. Tran whose telephone number is (571) 272-1469. The examiner can normally be reached on Monday-Thursday and every other Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on (571) 272-1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should

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you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

*Binh Tran*

Binh X. Tran